DEVELOPMENT CONSTRUCTION SPECIFICATION

C255

BITUMINOUS MICROSURFACING

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GENERAL

C255.01 SCOPE

1. The work to be executed under this Specification consists of the design, supply, mixing and placement of bituminous microsurfacing for surface correction and wearing surface applications on road pavements, carparks, cycleways and footpaths.

Bituminous Slurry

2. Bituminous microsurfacing shall consist of a mixture of emulsified polymer modified bitumen binder, mineral aggregate, mineral filler, additives and water proportioned and mixed to form a slurry which is placed and spread evenly on the road surface. It shall be capable of being spread in variably thick layers for surface correction and for wearing surface applications.

Size and Extent

3. The size, nominal thickness and extent of bituminous microsurfacing shall be as shown on the Drawings or as directed by the Council's Development Engineer.

Preceded by Sprayed Bituminous Seal

4. For all new works on road and carpark pavements, this Specification should be read in conjunction with Specification C244 - SPRAYED BITUMINOUS SURFACING. For new works on road and carpark pavements, bituminous microsurfacing shall be preceded by the application of a sprayed bituminous seal a minimum of two weeks prior to the application of the bituminous microsurfacing wearing course.

Sprayer Run Records Submitted to Council.

5. Particulars of the work performed shall be recorded on RTA Form 23 - Bituminous Surfacing Daily Record. Details of nominated mix, primer, primerbinder, binder and aggregate applied shall be recorded immediately after every sprayer run. The Contractor's representative shall sign each form as a true record of the work performed. The Contractor shall supply to the Council's Development Engineer a copy of each completed form within 2 days. Confirmation of the works records will be required prior to release of linen plan.

C255.02 TERMINOLOGY

Polymer Modified Binder

1. Bituminous microsurfacing is one of two types of bituminous slurry surfacing. It is distinguished from the other type, slurry seals, by the incorporation of polymer and/or other additives to the bituminous binder to improve the performance of the slurry surfacing.

Proprietary Names

2. Bituminous microsurfacing is also commonly known under various proprietary names such as 'cold overlay', 'microsealing', 'paveseal', 'microasphalt', etc.

Size

3. The size of the bituminous microsurfacing is based on the nominal largest stone size in the mix. For the purpose of this Specification, the size shall be either Size 5 or Size 7.

C255.03 REFERENCE DOCUMENTS

Documents Standards Test Methods

1. Documents referenced in this specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

(a) Council Specification

C244 - Sprayed Bituminous Surfacing

(b) Australian Standards

AS 1141.11 - Particle size distribution by dry sieving
AS 1141.12 - Material finer than 75 μm in aggregates (by washing)
AS 1141.22 - Wet/dry strength variation

AS 1141.23	-	Los Angeles value
AS 1141.25	-	Degradation factor - source rock
AS 1141.42	-	Pendulum friction test (PAFV)
AS 1160	-	Bitumen emulsions for construction and maintenance of pavements
AS 1289.C7.1	-	Determination of the sand equivalent of a soil using a power-operated shaker
AS 2008	-	Residual bitumen for pavements
AS 2357	-	Mineral fillers for asphalt
AS 2891.3.1	-	Bitumen content and aggregate grading (reflux method)

(c) International Slurry Surfacing Association

ISSA TB 100	-	Test method for wet track abrasion of slurry surfaces
ISSA TB 114	-	Wet stripping test for cured slurry seal mix
ISSA TB 139	-	Test method to classify emulsified asphalt/aggregate mixture systems by modified cohesion tester measurement of set and cure characteristics
SSA TB 144	-	Test method for classification of aggregate filler-bitumen compatibility by Schulze-Breuer and ruck procedure

MATERIALS

C255.04 BINDER

1. The binder supplied and used in the works shall be emulsified polymer modified bitumen, formulated to meet the performance requirements of the mix specified in Clauses C255.10 and C255.18.

Polymer Modified Bitumen Emulsion

2. Prior to emulsification, incorporation of polymer and/or additives, the bitumen shall comply with AS 2008.

Specification

3. The Contractor shall provide the Council's Development Engineer with sufficient information to verify that the binder supplied is the same as that nominated in the mix design.

Verification

C255.05 MINERAL AGGREGATES

1. Mineral aggregates shall consist of crushed rock or crushed gravel, or a mixture of crushed rock or crushed gravel and natural sand. It shall consist of clean, hard, angular, durable particles, and free form clay, dirt, organic material or other deleterious matter.

Quality

2. The aggregate from each source shall comply with the requirements given in Table C255.1.

Aggregate Properties

Property	Test Method	Requirement
Degradation Factor	AS 1141.25	50 minimum
Los Angeles Value	AS 1141.23	30 maximum
Aggregate Wet Strength	AS 1141.22	150 kN minimum
Wet/Dry Strength Variation	AS 1141.22	30% maximum
Polished Aggregate Friction Value	AS 1141.42	45 minimum
Sand Equivalent	AS 1289.C7.1	60 minimum

Table 255.1 - Aggregate Properties

3. When tested in accordance with AS 1141.11 and AS 1141.12, the aggregate (including mineral filter) shall conform to the grading limits given in Table C255.2. ***Grading Limits***

Sieve Size	Percent Passing by Mass	
	Size 5	Size 7
13.2 mm	100	100
9.50 mm	100	100
6.70 mm	100	85-100
4.75 mm	90-100	70-90
2.36 mm	50-70	45-70
1.18 mm	30-50	28-50
600 µm	20-35	19-34
300 µm	12-25	12-25
150 µm	7-18	7-18
75 µm	4-10	5-15

Table C255.2 - Grading Limits for Combined Aggregate/Filler

4. The Contractor shall nominate the source/s of aggregates to the Council's Development Engineer, and shall submit NATA certified test reports on the quality and grading of the combined aggregate proposed to be used. ***NATA Certification***

5. The Contractor shall submit test results to the Council's Development Engineer for each lot/stockpile with the works record ***Contractor to submit***

C255.06 MINERAL FILLER

1. Mineral filler shall consist of hydrated lime, flyash, portland cement, or other material approved by the Council's Development Engineer. ***Type***

2. The mineral filler shall be dry, free from lumps and any deleterious material, with a minimum of 85 per cent passing a 75 µm sieve. In all other respects, the mineral filler shall comply with the requirements of AS 2357. ***Quality***

3. The quantity of filler added to the bituminous slurry during placement shall not vary by more than 1 per cent from the filter content nominated in the mix design. ***Proportion***

C255.07 WATER

1. Water added to the bituminous slurry shall be potable and shall be compatible with the component materials. ***Potable***

C255.08 ADDITIVES

1. Details of the type, source and nominal proportions of additives shall be submitted to the Council's Development Engineer with the mix design. ***Type and Proportion***

C255.09 SAMPLING AND TESTING OF MATERIALS

1. Sampling and testing of materials shall be arranged by the Contractor and carried out by a NATA registered laboratory for the nominated test methods. ***Contractor's Responsibility***

MIX DESIGN

C255.10 MIX PROPERTIES

1. The nominated mix design shall satisfy the properties given in Table C255.3. ***Mix Properties***

Mix Property	Test Method	Requirement
Wear Loss	ISSA TB 100 1 hour 6 day	 540 g/m^2 maximum 800 g/m^2 maximum
Traffic Time	ISSA TB 139 30 minutes 60 minutes	 12 kg.cm minimum 20 kg.cm minimum
Adhesion	ISSA TB 114 or ISSA TB 144	≥ 90% or 11 grade points minimum (AAA, BAA)

Table C255.3 - Mix Properties

C255.11 NOMINATED MIX

1. The Contractor shall submit to the Council's Development Engineer, details of the nominated bituminous microsurfacing mix design for the work. The details shall include the target application rate (m^3 of mix/m^2 of road surface) and the corresponding nominal layer thickness, together with NATA certification and test results demonstrating that the nominated mix and its constituents meet the requirements of the Specification. ***Submit for Approval***

2. The details of the nominated mix design shall include the following: ***Mix Design Details***

   (a) Bitumen emulsion content of the mix, and the residual binder content of the emulsion;

   (b) Target combined aggregate/filler grading;

(c) Proportions of constituent materials used; and

(d) Type and sources of aggregates, filler and binder.

PRODUCTION AND PAVING

C255.12 REQUIREMENTS OF PRODUCTION MIX

1. Bituminous microsurfacing produced in the paving unit at the site shall be known as the 'production mix'. ***Production Mix***

2. The production mix shall comply with the requirements given in Table C255.4. ***Permitted Variation***

Production Mix Properties	Maximum Permitted Variations from Approved Mix (by mass)	
	Size 5	Size 7
Grading*		
Passing 9.50mm AS sieve and larger	Nil	Nil
Passing 6.70mm	Nil	± 7%
Passing 4.75mm	± 6%	± 6%
Passing 2.36mm and 1.18mm	± 5%	± 5%
Passing 0.600mm	± 4%	± 4%
Passing 0.300mm	± 3%	± 3%
Passing 0.150mm	± 2%	± 2%
Passing 0.075mm	± 1.5%	± 1.5%
Residual Binder Content	- 0.5% + 1.0%	- 0.5% + 1.0%
* Notwithstanding, these allowable variations shall not fall outside the limits for design of nominated mix as given in Table C255.2.		

Table C255.4 - Maximum Permitted Variations from Approved Mix

C255.13 PAVING UNIT CALIBRATION

1. The paving unit to be used shall be calibrated for the component materials of the approved mix prior to the commencement of paving. Previous calibration documentation covering the same materials and approved mix shall be acceptable provided that calibration has been carried out within the previous twelve months. ***Calibration***

2. The documentation shall include an individual calibration for each component material at various settings, which can be related to the paving unit's metering devices. ***Documentation***

3. No paving unit shall be allowed on the work until the calibration has been completed and approved by the Council's Development Engineer. ***Approval by Superintendent***

C255.14 PREPARATION OF PAVEMENT

1. The existing surface shall be clean and free from any loose stones, dirt, dust and foreign matter. The surface shall be swept beyond the edge of the area to be surfaced by at least 300mm. Any foreign matter adhering to the pavement and not swept off shall be removed by other means. Any areas significantly affected by oil contamination shall be cleaned to the satisfaction of the Council's Development Engineer. ***Clean Pavement***

2. Minor surface defects existing in the primer seal or seal shall be repaired to the satisfaction of the Council's Development Engineer prior to the spreading of bituminous slurry. ***Minor Repairs***

3. The Contractor shall take all necessary precautions to prevent the bituminous slurry or other materials used on the work from entering or adhering to kerbs, gutters, driveways, gratings, hydrants, valve boxes, manhole covers, bridge or culvert decks or other road fixtures. After the bituminous slurry has been spread the Contractor shall clean off any such material and leave such gratings, manholes and other road fixtures, in a clean and satisfactory condition. ***Protection of Services***

C255.15 WEATHER LIMITATIONS

1. Bituminous microsurfacing shall not commence if either the pavement or air temperature is below 10°C and falling. ***Temperature***

2. Bituminous slurry may be applied when both pavement and air temperatures are above 7°C and rising, or above 10°C. ***Temperature***

3. Spreading shall not proceed during rain or when rain appears imminent. ***Rain***

C255.16 SPREADING

1. The surface may be pre-dampened if necessary by fogging ahead of the spreader box. Water used for pre-wetting the surface shall be applied so that the entire surface is damp with no apparent flowing water ahead of the spreader box. The application rate of the fog spray shall be adjusted to suit temperature, surface texture, humidity and dryness of the surface being covered. ***Water Fog Spray***

2. Bituminous microsurfacing shall be mixed and applied using a purpose built paver. The slurry mix shall be of the desired consistency when deposited in the spreader box, and nothing more shall be added other than minor amounts of water for the purpose of overcoming temporary build-up of slurry in the corners of the spreader box. ***Paving Unit***

3. The mixing time shall be sufficient to produce a complete and uniform coating of the aggregate and the resulting mixture shall be conveyed into the moving spreader box at a sufficient rate to always maintain an ample supply across the full width of the strike-off. ***Mixing Time and Rate***

4. The strike-off shall be adjusted to provide an application rate that will completely fill the surface voids and provide the nominal application rate of bituminous microsurfacing as scheduled. ***Application Rate***

5. After the bituminous slurry has been spread, the Contractor shall ensure that all kerbs, gutters, driveways, gratings, hydrants, valve boxes, manhole covers, etc are uncovered and left in a clean and satisfactory condition. ***Clean Services***

6. After the emulsion has broken and the mix is sufficiently stable, rolling shall be carried out using pneumatic tyred rollers to produce a dense, even, homogeneous compacted surface. ***Rolling***

7. Bituminous microsurfacing shall be capable of carrying slow moving traffic (<40km/h) within one hour of application without undue permanent damage occurring, such as rutting or ravelling. When the time before the slurry is capable of carrying traffic exceeds one hour, work shall cease if so directed by the Council's Development Engineer. ***Traffic***

C255.17 SURFACE TEXTURE

1. The resulting surface after spreading shall be uniform in appearance, and free of areas exhibiting segregation or excessive or insufficient binder. ***Uniform Texture***

2. The surface texture shall be demonstrated on a short test run for approval by the Council's Development Engineer. If the surface texture is acceptable to the Council's Development Engineer, then all subsequent work shall be finished to an equivalent surface texture. ***Test Run***

3. Where increased surface texture is required, a fabric skirt may be trailed behind the spreader box. ***Increased Texture***

C255.18 JOINTS

1. Longitudinal joints in the wearing course shall be straight and placed at either the edge or the centre of a traffic lane. If necessary, the edges and joints shall be lightly screeded with a hand squeegee to achieve a smooth uniform appearance and to remove excess build-up of material. ***Uniform Joints***

C255.19 SAMPLING AND TESTING OF PRODUCTION MIX

(a) Lot Definition

1. Compliance sampling and testing of bituminous microsurfacing shall be undertaken on a lot by lot basis. For this purpose, 50m^3 or one day's production (whichever is the lesser), or such smaller quantity which is considered as representative of consistent production of the paving unit, shall be considered as representative of consistent production of the paving unit. ***Lots***

(b) Responsibility of Sampling

1. The Contractor shall be responsible for taking samples and shall supply all facilities, equipment and labour for that purpose. ***Contractor's Responsibility***

(c) Frequency of Sampling

1. For the testing of production mix, two 1.5kg representative samples of bituminous slurry shall be taken from each lot at random intervals. The samples shall be taken from the discharge to the paving unit and the sample containers immediately sealed. ***Mix Samples***

2. For the testing of the binder, two 2L samples of bitumen emulsion shall be taken from each bulk delivery in accordance with AS 1160. ***Bitumen Emulsion***

(d) Testing

1. The samples of bituminous slurry shall be treated and tested at a NATA registered laboratory to confirm compliance with Table C255.4. Prior to testing for Residual Binder Content and Aggregate Gradation, as determined by AS 2891.3.1, the samples shall be dried to constant weight in an oven at 60°C for a minimum of 15 hours. ***Mix Tests***

2. Each delivery of emulsion shall be tested for residual binder content or accompanied by a certification of specification compliance traceable to the relevant batch at the supplier's storage tank. If testing is required, then one sample of bituminous emulsion shall be tested for Residue from Evaporation in accordance with AS 1160 Appendix D, and the second sample retained as a referee sample. ***Emulsion Tests***

C255.20 SHAPE AND LEVELS

1. The finished surface level shall not vary from the design level at any point by more than ± 10mm. Additionally immediately adjacent to any kerb and/or gutter the finished surface level shall not be below nor more than 10mm above the level of the lip of the adjacent gutter. ***Level Tolerances***

2. Notwithstanding the above, the deviation from a 3m long straight edge placed ***3m Straight***

anywhere on the top of the finished surface shall not exceed 10mm. ***Edge***

C255.21 NON-CONFORMANCE OF MATERIALS AND FINISHED SURFACING

1. If any materials supplied fail to conform to the requirements in this Specification or if any section of bituminous microsurfacing fails to conform to the requirements of this Specification - whether failure of the work is due to bad workmanship, defective materials supplied by the Contractor or materials made defective by the method of operation adopted - then such failure or failures shall constitute a 'Non-conformance' under the Contract. Such nonconforming sections of bituminous microsurfacing work shall be either replaced or corrected. ***Non-conformance Conditions***

2. Materials removed from the site by the Contractor shall be replaced with materials that conform to this Specification. ***Replacement Materials***

LIMITS AND TOLERANCES

C255.22 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C255.5 below.

Item	Activity	Tolerances	Spec Clause
1.	Mineral Aggregate	As per Table C255.1	C255.05
2.	Combined Aggregate/filler	As per Table C255.2	C255.05
3.	Mineral Filler	> 85% passing a 75μm Sieve	C255.06
4.	Mix Properties		
	a) Design properties	As per Table C255.3	C255.10
	b) Permitted variations	As per Table C255.4	C255.13
5.	Surface Preparation	Sweeping shall extend at least 300mm beyond edge of area to be surfaced	C255.15
6.	Weather Limitations	Microsurfacing shall not commence if both air and surface temperature is below 10°C and falling, and shall only commence if both air and surface temperature is above 7°C and rising or above 10°C	C255.16
7.	Shape and Levels		
	a) Finished Levels	Shall not vary at any point by more than ± 10mm from design levels. Immediately adjacent to kerb and/or gutters, levels shall not be less than nor more than 10mm from design level	C255.21
	b) Finished Shape	Deviation from the bottom of a 3m straight edge shall not vary by more than 10mm	C255.21

Table C255.5 - Summary of Limits and Tolerances